Abstract of the Disclosure

Methods and apparatus for producing small, bright nanometric light sources from apertures that are smaller than the wavelength of the emitted light. Light is directed at a surface layer of metal onto a light barrier structure that includes one or more apertures each of which directs a small spot of light onto a target. The incident light excites surface plasmons (electron density fluctuations) in the top metal surface layer and this energy couples through the apertures to the opposing surface where it is emitted as light from the apertures or from the rims of the apertures. Means are employed to prevent or severely limit the extent to which surface plasmons are induced on the surface at the aperture exit, thereby constraining the resulting emissions to small target areas. The resulting small spot illumination may be used to increase the resolution of microscopes and photolithographic processes, and to increase the storage capacity and performance of optical data storage systems.